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## TERRAFORMING: RECONSTRUCTING THE EARTH, RECREATING LIFE

BIOPOLITICS ANTHROPOCENE, BIOPOLITICS, EARTH, HYPERJECT, NATURE, TECHNO-POLITICS, TECHNOLOGY, TERRAFORM

### Reconstructing the Earth

Power is at the core of the geo-constructivist conception of the world. The power of humanity as a kind to reduce its status of a species to its smallest part; a power that takes place on a devitalized planet. But power can be understood in two different ways: in political terms, as a form of governance, a kind of management; but before examining the eventual conditions for a governance of the Earth, we must insist on the following point: the political dimension of geo-constructivist power cannot be understood without taking into consideration its technological dimension. Before being a biopolitics, geo-constructivism is a techno-politics. This techno-politics invents an off-planet position for humanity from which, as we have already noted, humankind would be able to rebuild the planet according to its own desires. In this chapter, we will descend into the engine room of the geo-constructivist grand narrative, inside the secret chamber of its most persistent and ferocious fantasy: recreating the Earth, reconstructing life on Earth — to the point of repudiating death. The genealogy of this fantasy traverses the imaginary of the Space Age, as if, secretly, the Anthropocene had somehow inherited this imaginary. Let's begin by studying the transfer of the imaginary from the Space Age to the Age of Man.

Of course, it's not a coincidence that we find ourselves speaking of the imaginary and fantasy, as there is indeed something fantastical haunting the geo-constructivist soul. Since reconstructing the Earth is derived from a term that originally comes from science fiction: "terraforming". Jack Williamson was the first to coin the term in a short story called "Collision Orbit", published in 1942. In the story, the author imagines "space engineers" transforming an asteroid into an inhabitable place, thanks to an ingenious "para-gravity" system capable of rendering the atmosphere of the stellar body heavier. Aside from this example, we can define terraforming as the operation consisting of rendering other stellar bodies — mainly planets and eventually asteroids — appropriate for human life. What is at stake is the possibility for another planet to become inhabitable, by way of modifying its ecosphere in such a way so as to make it possible for human beings to survive there, or in creating this life-sustaining ecosphere from scratch, so as to resemble the Earth.

Far from simply limiting itself to an imaginary arising out of science fiction, the idea of terraforming appears to have seduced many scientists for reasons that are intrinsically linked to the Anthropocene and to questions about geoengineering. In *Pale Blue Dot*, published in 1994, the famous astronomer Carl Sagan describes humans as vagabonds, nomads who left their birthplace of Africa and who would, one day or another, leave the cradle of Earth. For Sagan, it's not simply for ontological reasons that human beings will have to answer the call of leaving Earth for Outer Space, but also for ecological reasons: "As the Earth's climate changes in the coming decades, there are likely to be far greater numbers of Environmental refugees." Therefore we must take back up our baton as pilgrims and head off in search of other planets to migrate to. But Sagan adds that, in contrast to the migrations of peoples that take place on Earth, including those migrations to the New World of North America several hundred years ago, the migrations into Outer Space will face desert lands: "there are no distant relatives, no humans, and apparently no life waiting for us on those other worlds". In other words, life will have to be created — or, at the very least, it will be necessary to create the conditions thanks to which life will be possible. Chapter 19 of Sagan's book, "Remaking The Planets" will therefore be focused on terraforming. Sagan goes through a variety of possibilities including terraforming Venus (by way of re-cooling the surface of the planet, by creating, for example, a nuclear winter through injecting the pulverized debris of an asteroid into Venus' atmosphere), Mars, (by way of creating a greenhouse effect that would be catastrophic on Earth but which would be a godsend on Mars), or even the moons of Jupiter. It may appear as a troubling fact to read today that already in 1994, Sagan clearly saw the connection between the hypothesis of terraformation and what we now call the Anthropocene:

We need look no further than our own world to see that

humans are now able to alter environments in a profound way.

Sagan clarifies that these changings – the depletion of the ozone layer, global warming, etc. — happened due to inattention, whereas now it's possible to produce these effects intentionally. In this sense, terraforming would be nothing more than controlled anthropic terrestrial alteration. We should also note that Sagan is well aware of the fact that "some of the techniques that might eventually terraform other worlds might be applied to ameliorate the damage we have done to this one": Sagan, the great lover of otherworldliness, tells us that we must create a life-size "test" of terraforming on our world, guaranteeing its inhabitability, before using these techniques on other planets in the solar system. Strange mirror reversals, where the terraforming of other planets and the anticipation of strictly earthbound geoengineering exchange their qualities and objectives: is the future of humanity truly beyond Earth, or should we indeed rebuild our planetary cradle?

### The Reversal of the Frontier

Sagan writes that during the hunter-gatherer period, "the Frontier was everywhere", but we have abandoned nomadic life; from now on, we can find this form of life, again, in outer space; and Sagan cites Melville's *Moby Dick*: "I'm tortured by an everlasting itch for things remote. I love to sail forbidden seas..." Frontiers, galactic pioneers, distant lands: in his argument often laced with hints of lyrical romanticism, Sagan in fact appeals to a myth that is deeply anchored within the historical imaginary of the United States of America: the "national myth of a Frontier", as it is also named by William Cronon. This myth deals with the manner in which the great movement of the pioneers toward the West was represented during the 19th century: as if they had traversed and truly encountered a wild part of nature, never before touched by human beings. The historian Frederick Jackson Turner argues that the "end" of the Frontier — the end of expansion toward the West — had been replaced by America's psycho-political investment in the wilderness as a new "wild" space: the wilderness became the avatar of the Frontier. As the historian Howard E. McCurdy demonstrates in *Space and the American Imagination*, the arrival into the Space Age, symbolized by the inaugural launch of Sputnik in 1957, became a new incarnation of the Frontier myth. Space, McCurdy writes, was described, dreamt of, and constructed by the American government, the popular press, within the movies and TV. shows, as well as scientific discourse, as the "final frontier", as the promise of new virgin territories to conquer, a horizon as distant and vast as that of all of North America and its appetite for Melville's "forbidden seas." And with this final frontier, there will more than likely be no natives to eliminate — except perhaps, some very rudimentary subterranean life forms. Just a bit of anticipated terraforming to plan for that can quickly be put into place following the likes of the representations proposed by Robert McCall, known among other things for his illustrations of the Space Age — for magazines such as *Life*, for NASA, and Stanley Kubrick. An alternative solution: create some sort of "cosmic ark", a colony that would be suspended in the void thanks to an artificial gravitational system (like the one we still seeing being proposed in the film *Interstellar* in 2014, see the image below).

What sort of future did the promoters of the "Final Frontier" anticipate? In 1986, The Report of the National Commission on Space, presided over by a former director of NASA, recommended the installation of an advanced post on the Moon by 2006, and humans on Mars by.. 2015: "Many of the people who will live and work on that Mars Base have already been born", the authors of this report shrewdly claim. Among the arguments put forth in order to garner excitement about extra-terrestrial colonization would be the possibility of loosening the ecological constraints on an Earth that is becoming more and more populated, where the competition for limited resources was only going to grow. But the future has been more complicated than we anticipated. The last time an American made it as far as the moon, notes the journalist Elizabeth Kolbert, was in 1972! The Frontier lowered itself into the terrestrial orbit of the International Space Station launched in 1998. A number of ambitious projects have since been abandoned, such as the new United States space shuttle scheduled for completion in 2011, or the Constellation program that targeted a return to the Moon in 2020 followed by an inhabited flight to Mars. Little by little, desire and the imaginary deserted

the deserted space of outer space. But why?

Firstly, the techno-scientific emulation generated by the Cold War — Sputnik vs. Apollo — tumbled to the ground along with the Berlin Wall. The end of the USSR, as the astronomer Chris Impey notes, led to a collapse in research funds for Soviet Space Exploration. As for the Americans, a series of repetitive traumas — the Challenger crash in 1986, then the crash of the Columbia in 2003 (seven deaths in both cases) — have not helped the situation: the second death of Christopher Columbus (the spaceship Columbia) wasn't a good omen. Far from being a frontier leading toward the propagation of life, the Space Age transformed into a wall upon which astronauts could crash. The conjugated results from this historical period and its disappointments: a drastic reduction of NASA's budget. Hence the title of an article from *The Economist* in 2011, while the United States buried — if we can put it that way — the project for a new shuttle: "The End of the Space Age" — the article specified that "Inner space is useful. Outer space is history." The abandonment of the Space Age as a grand narrative led to what we will refer to as the Reversal of the Frontier. The psycho-political investment of the conquest of space during the Space Age was transformed into an investment regarding the conquest of the Earth: a hypermodern conquest in search of an Earth 2.0 that is not outside of geostationary orbit, but rather resides on the workshop table of geoengineers. An Earth that has neither become virtual nor digital but an Earth that has become an augmented reality. In a certain manner, this reversal or U-turn has consisted of representing the Earth as if it was another planet, like an exo-planet, as some other stellar body without any specific qualities, as some kind of material without any relation whatsoever to our own human history. In this sense, geoengineering, as it has been promoted by the geo-constructivists, is the inheritor of the terraforming projects that have haunted as much the imaginary of science fiction as they have all of the post-war sciences. The end of the Space Age will have therefore been one of the historical conditions necessary for the birth of the Anthropocene: for this grand narrative, humanity is external to Earth not simply because humanity considers itself as some kind of non-living entity, but also because the Earth is considered as being non-terrestrial. Going from the Space Age to the Age of Mankind, the grand narrative of the Anthropocene took over the symbolic conquest of Space: remake the climate, remake everything in an anthropic way, and without leaving the Earth. A sort of domestic terraformation.

It's true that certain private companies have taken the baton passed to them from the Nation-states, such as Virgin Galactic, who want to "democratize access to space for the benefit of life on Earth". Led by the highly media savvy Richard Branson, this company sports an apparently unrelenting faith in the conquest of space and present itself as "an explorer of the Frontier of space", defining the human species by its capacity to "go beyond its boundaries", and valuing those who have an "irresistible urge to see what lies just beyond the horizon". As for Elon Musk, Silicon Valley's rising star and head of space company SpaceX, — following the proper geo-constructivist logic — the conquest of space is simply about saving the planet. In order to do this, on one hand, one should develop a so-called "green energy" (on Earth), in other words, electric cars (which is the *raison d'être* of Tesla Motors, directed by Musk); on the other hand, for the human race to survive, one also must "become a multi-planetary species", establishing a colony on Mars as soon as we possibly can. Not without a bit of humor, Musk has even exclaimed "It'd be pretty cool to die on Mars, just not on impact." While it's still easy to find people, such as the writer Stephen L. Petranek, who believe that Mars ""will become the new frontier, the new hope, and the new destiny for millions of earthlings who will do almost anything to seize the opportunities waiting on the Red Planet", these private space companies have also experienced their setbacks — such as the sub-orbital crash of the craft SpaceShipTwo (constructed by Virgin Galactic) in October 2014 (with one death), and the explosions of a Falcon-9 (SpaceX) in June 2015 and September 2016. What's more, it appears that transporting human life into space is a rather difficult task, the interstellar void is frankly not that favorable to humans, and the task of adapting to another planet while humans are pretty much made for planet Earth, is anything but obvious. The dream of finding a solution beyond the Earth is to forget, as Elizabeth Kolbert rather eloquently puts it, that "wherever we go, we'll take ourselves with us".

In other words, the Reversal of the Frontier, which is the psycho-economical operation at the heart of the Anthropocene, does not imply a drought of extra-planetary desire. Not a month goes by that we don't discover a new exo-planet that could possibly hold the conditions for life and the welcoming migratory flight of humans from Earth. And aside from a "plan B", and the ongoing discussions regarding geoengineering the Earth's climate, there is still talk of a "plan C" which would be the exodus to another planet. But geo-capitalism doesn't seem to lend much credit to such an eventuality. Is this due to the fact that the idea and representation of a "cosmic ark" has something of a *déjà vu* about it, like a ghost from the 1950s? Is it because such a project would contradict the terrestrial limits of the grand narrative of the Anthropocene? As a symptom of this problem, let's consider the special issue that the popular French science journal *Science et Vie* dedicated to "extra-solar paradises", to superhabitable planets, that is to say "lands more habitable than our own": the magazine tells us that there would be more than five billion superhabitable planets! That's something to get any colonizer excited! Unfortunately, further along in the same article, two other inserts indicate that: 1) there are no means for propulsion possible to allow us to arrive to these exo-planets — it would take 5,000 years to make it to the closest one — and it's hard to imagine an ark that would journey longer than it took *Homo sapiens* to develop... 2) these super-planets would be wonderful for fostering life — but not for human life: the gravity would be too great. The Reversal of the Frontier leaves to the geo-constructivists the care of rebuilding the Earth, whereas a bit of imagination is left for the construction of space shuttles condemned to monotony: circling the Earth in perpetuity without ever leaving the upper atmosphere for outer space. Concerning the real exo-planets, the fact that they are beyond our reach does nothing but confirm the necessity of geo-constructivism.

**Recreating life: creation, synthesis, resurrection**

Terraforming is intrinsically linked to the stakes of the living [du vivant]. First for ethical reasons: terraforming or any kind of colonization would alter the exo-planet, preventing the scientist from analyzing the extraterrestrial environment as it is, untouched by humans, and putting at risk the life forms that would already potentially exist on the planet — such as micro-organisms. Beyond these somewhat premature ethical questions, it's important to understand that the idea of terraforming is linked with one of humanity's oldest dreams: recreating life, that is, to artificially master the processes for the generation of life — even if this reformatting of life bears with it some form of collateral damage, like the extinction of an exo-planetary form of life.

It's not by chance that James Lovelock, the inventor of the Gaia hypothesis, namely, the theory by which the Earth functions as a kind of super-organism, is also the same person who wrote a book about terraforming Mars: *The Greening of Mars*, published in 1984. And yet, the Gaia hypothesis arose out of the work Lovelock did for NASA regarding the possibility of detecting life on Mars. To sum up this earlier work: if there is life on Mars, this life will use the atmosphere, will change it, and will transform it for its own use. If the atmosphere on Mars appears stable, without any signs of disturbance, then there is a large probability that there is no life on Mars: if the atmosphere is in a state of "non-equilibrium" and resembles a "meta-stable" system, one can bet on the fact that living beings would have produced this dynamic disequilibrium. From this fact, Lovelock concludes, the dry, flat aspects of Mars, the relative chemical equilibrium of the Martian atmosphere doesn't leave us with much to think that there is a presence of life on Mars. Almost twenty years after its publication, *The Greening of Mars*, turns the argument in question on its head: how do we create a dynamic disequilibrium that would make Mars in fine habitable for human beings? Starting with a terraforming by an intensive bombing of the Martian soil in order to create an artificial greenhouse effect, followed by the colonization of living organisms that could transform the atmosphere for their advantage.

Of course, the desire to produce life through and within artificial conditions is nothing new — from Pygmalion to the facetiae of Dr. Frankenstein. But with what we have called the Reversal of the Frontier, that is to say, an influx of psychic, political, and economical investments, reemerging from a Space Age considered as obsolete, and moving toward an age of Man (re)turning back toward Earth, it's as if the production of life has become the principal piece of a will toward a limitless terraforming: remaking life as the principal dimension for remaking the Earth. From the greening of Mars, we move to the greening of the Earth, as if the latter, in a certain way, seemed to be lacking life, as if the Earth were already dead. This is what, according to us, indicates the growing importance granted to synthetic biology. A science undergoing a great expansion and unleashing in its wake a colossal financial investment, synthetic biology was defined in 2010, by a commission in the United States, as "a scientific discipline that relies on chemically synthesized DNA, along with standardized and automatable processes, to address human needs by the creation of organisms with novel or enhanced characteristics or traits." Synthetic biology could finally be used to confection new ways of creating GMOs, for producing new medicines, new bio-fuels, bacteria that could help us to diminish our use of toxic substances, even creating lightweight synthetic spider silk that could be used in the aviation or automobile industries. Established on the idea that the living is reducible to "bricks" (BioBricks), synthetic biology is highly compatible with the ideas of geo-constructivism: we could use it to address the problems of climate change as well as energy and food shortages thanks to an almost miraculous technological solution.

With its "enormous power for altering life on Earth", synthetic biology is certainly not without its potential dangers: new organisms, such as GMOs in general, will always be susceptible to unbridled proliferation, of mutating and replacing grey pollution (industrial pollution) with an "augmented" green pollution (a genetic pollution). More generally, synthetic biology rebels against, and is in radical opposition to, any kind of idea of conservation — of the environment or of a species: why protect what we can improve, or reconstruct? This sort of substitution of conservation by synthesis is particularly visible within current projects on "de-extinction" that would allow for the resurrection of certain species that have already recently disappeared (such as the passenger pigeon and the dodo bird), but also species that went extinct long ago (such as the Aurochs). Sometimes these projects are connected with a desire to "rewild" certain territories such as the Oostvaardersplassen nature reserve in the Netherlands, supposedly with the intention of restoring a Paleolithic type of nature, a "new nature" whose traits would nevertheless be to resuscitate a nature that was already dead and buried. However, the de-extinction of species does imply a minimum amount of conservation, since it is only possible by way of using intentionally preserved DNA — or some kind of fossilized DNA — belonging to a disappeared species, a conservation that could implicate systems of cryo-conservation (where cells are frozen at very low temperatures). However, can we claim, along with Stanley Temple, a professor who specializes in conservation and wildlife in general, that the very act of "re-creating" disappeared species would be an "unprecedented biological (our emphasis) event"? What actually is the status of the living implied within activity of reviving "dead species"? What does it mean to give life back to a Pleistocene landscape? Would it really be creating life? Or rather, would it be a form of producing non-life, some kind of form of the living-dead? Stanley Temple is correct: recreating dead species is "no longer science fiction". But that is precisely the problem. From now on, the hypothesis that "extinction will no longer be forever", and that now there will be new forms of invasive species, of species "coming from the past", is not science fiction but fiction that has been made into science: the materialization of technologically-assisted specters.

In this sense, de-extinction should be interpreted less as a promise of progress than as a threat whose fallout we cannot as yet measure. Not simply for the obvious reasons that the desire for treating the causes of environmental disasters and the loss of bio-diversity risk being abandoned for the benefit and profit of the merchant desire of reformatting life, but also because death itself no longer has a place within this scientifico-discursive apparatus. Of course, de-extinction will not really resuscitate

disappeared species: it will genetically create new ones, in contact with environments that are completely different than those with which the disappeared species had actually been confronted with. We get a much better depiction of the future in Jurassic World (directed by Colin Trevorrow, 2015) and its alternative past inhabited by hybrid dinosaurs than by Jurassic Park (directed by Stephen Spielberg, 1993) and its cloned dinosaurs. And yet, even if de-extinction is for the moment still a fantasy, it takes nothing away — it's completely the opposite — from its effectiveness within reality: to conquer death, to rip away the mortality that clings on to living beings and to be able to toss it into the garbage heap of obsolete anxieties and fears, is precisely the aspiration that underpins the genetic acrobatics of our current era.

Finally, we are confronted with something that should force us to reinterpret Foucault's hypothesis regarding biopolitics as a modern form of governmentality, in the manner in which it began developing starting in the 17th century, consisting of "making living" and "letting die" — instead of "making die" and "letting live" in the manner of more ancient sovereign societies. Since the problem for those we will call the bio-constructivists, is not first and foremost to improve the living, but to repudiate death. We could say that there is nothing new about this repudiation, and that numerous cultures have been founded on the denial of death. But with the advent of de-extinction and its regeneration of zombies, it will become less a question of "making live" than re-making live. The death of nature will simply have been the necessary step toward the programming of its controlled resurrection.

**Excerpt from The Unconstructable Earth: An Ecology of Separation**

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